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TAXONOMICAL PROBLEMS AND ZOOGEOGRAPHICAL INVESTIGATION OF THE STONEFLY (PLECOPTERA) FAUNA OF THE CARPATHIAN BASIN AND THE BALKANS

PhD Theses

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INTRODUCTION AND AIMS

At the beginning of the third millennium, there were 135 species known from the Carpathian Basin and 188 from the Balkans. The faunistical exploration of the Carpathian Basin, contrary to other parts of Europe, should be regarded as moderate while the Balkans are rather poorly known. Furthermore, knowledge on each countries are variable within the regions. For example, the stonefly fauna of Romania is one of the best known in Europe, due to the activity of Béla Kis. On the other hand, the Albanian fauna was nearly unknown before the beginning of my researches.

Besides the deficiencies of faunistical exploration, there are many taxonomical problems regarding to the stoneflies of the Carpathian Basin and the Balkans: quite many species known only from one gender, larvae are unknown or only deficiently known in most of the species, and the validity of some taxa should be questioned.

Both of the areae are rich in endemic species and their geographical borders can be drawn quite explicitly. Even so, the relationship of the stonefly fauna with the neighbouring regions, and relation of the fauna of well separated mountain systems and drainages of the Carpathian Basin and the Balkans were investigated only as a supplement of faunistical or taxonomical works, especially in the case of the Balkans.

In the light of the above, my aims were as follows:

Faunistics: Further exploration of the Carpathian Basin and the Balkans, especially in the hardly investigated areas and the border zones.

Taxonomy: To review the taxonomical problems of the species known from the Carpathian Basin and the Balkans, solve these as far as possible, and to describe the new species turned up during the faunistical expolrations.

Zoogeography: To characterize the zoogeographical aspects of the stonefly fauna of the Carpathian Basin and the Balkans, and to describe their relations.

MATERIAL AND METHODS

Specimens were collected using aquatic net, sweeping net, singling and biting at about 700 watercourses of the Carpathian Basin and the Balkans, in an early spring, spring, early summer and autumnal data, as far as possible. 3500 lots were collected by 1996, specimens

are stored in 70% ethanol and deposited in the Collection of Smaller Insect Orders, Department of Zoology, Hungarian Natural History Museum. Besides my own material, I worked up or revised the additional 1500 lots of Carpathian Basin and Balkan stonefly material stored in the Hungarian Natural History Museum. Comparative material was borrowed or got as a gift from the following collections: Zoological Museum of Lausanne, Limnologischen Fluss-station des Max-Planck-Instituts für Limnologie, Slovenian Museum of Natural History, University of Natural Resources and Applied Life Sciences, Wien and Gilles Vinçon Collection, Grenoble.

Specimens were examined with binocular in 70% ethanol, when necessary, terminalia were cleared by boiling in 10% KOH for 5–10 minutes. Genital organs were mounted on slides in CMC-9AF liquid or in glycerin gelatine. Drawings were prepared using a camera lucida on binocular and biological microscopes, or the source is indicated in the text. SEM photos were made on Hitachi S-2600N scanning electron microscope, using golden-palladium coating after critical point drying. Maps were made by DIVA–GIS 5.4.0.1. program or after original drafts, multivariant analyses were made by SynTax 2000.

Faunistical data enumerated according to the regions used in the zoogeographical examinations. Literature data discussed on the basis of regional checklists and reviews signed in the Literature overview chapter of the thesis, sources indicated only when it is not included in those works. Data new for a region or a country signed after the list of synonymies. In the case of already published descriptions of new species, redescriptions or new larval descriptions, I included only the diagnoses and the affinities, the detailed descriptions can be found in the articles published. Descriptions, redescriptions and larval descriptions follow the actual methods, the examined morphological characters discussed in the methodological chapter of the thesis.

Zoogeographical observations were taken on the basis of my own faunistical results and the literature data. Proceeding from the divisions summarized in the Literature overview chapter of the thesis, I use the following division of the Carpathian Basin and the Balkans that is based on distributional patterns traced out by literatuer data and my own collectings: Carpathian Basin: Foothils of the Alps, Western Carpathians, Northern Carpathians, Hungarian low mountains, Eastern Carpathians, Transsylvanian Mountains, Southern Transdanubia, Fruška Gora and Southern Carpathians region; Balkans: Slavonia, Dinaric Mountains, Balkan Mountains, Western-Central Balkans, Eastern-Central Balkans, Eastern Balkans, Tekir Mountains, Pindos Mountains, Southern-Central Balkans and Parnassus region, Ionic Isles, Éuboa, Pelopponnes, Aegean Isles and Crete. Details of this division, the

enumeration of the hills and mountains included in each regions can be found in Appendix 1. Besides the units with endemic species, I dealt with some data deficient but geographically well separated regions as independent regions. The division includes only ranges above 300 meters.

RESULTS AND CONCLUSIONS

- I augmented the collection of the Hungarian Natural History Museum with 3500 identified lots, and I identified or revised the already existed material.
- I found 1 species new to the fauna of Ukraine, 1 for the fauna of Romania, 4 for the fauna of Hungary, 13 for the fauna of Croatia, 4 for the fauna of Serbia, 3 for the fauna of Montenegro, 3 for the fauna of Serbia-Kosovo, 1 for the fauna of Bulgaria, 1 for the fauna of Macedonia, 34 for the fauna of Albania, 13 for the fauna of Greece and 5 for the fauna of Turkey.
- 78 occurrences are new for the regions used in the faunistical division of the area.
- With the new records including also the species described the number of stonefly species known from the Carpathian Basin increased from 135 to 138, and the species known from the Balkans increased from 189 to 197.
- I described eight species and one subspecies new to science (*Leuctra pseudonigra* sp. n., *L. mortoni feheri* Murányi, 2007, *L. dalmoni* Vinçon & Murányi, 2007, *L. cornuata* sp. n., *L. malcor* Murányi, 2007, *Nemoura asceta* Murányi, 2007, *N. shqiperica* sp. n., *N. vinconi* Murányi, 2007, *N. anas* Murányi, 2007) and two hitherto unknown larvae (*Brachyptera phthiotica* Berthélemy, 1971, *Protonemura albanica* Raušer, 1963).
- I made redescriptions on three (*Leuctra prima* Kempny, 1899, *L. pseudosignifera* Aubert, 1954, *Nemoura peristeri* Aubert, 1963), complementary descriptions on four species (*Leuctra metsovonica* Aubert, 1956, *Perlodes intricatus* (Pictet, 1841), *Siphonoperla graeca* (Aubert, 1956), *Chloroperla zhiltzovae* Zwick, 1967).
- I defined three new species groups (*Nemoura brevipennis, N. fusca, N. peristeri* fajcsoport), furthermore a new status (*Siphonoperla graeca* (Aubert, 1956)) and a nomen dubium were proposed (*Leuctra kisi* Steinmann, 1968).
- I named the borders of the Carpathian Basin and the Balkans on the basis of the stonefly fauna, and divided these areae into regions.

- I analysed the relations of the regions, and the relations with the neighbouring units of the Carpathian Basin and the Balkans on the basis of their fauna. I stated that the higher parts of the Carpathian Basin, the Northern and Central Balkans, and the Southern Balkans are well separated.
- On the basis of the distribution of the endemics, I detected well deliniated focus areae in the case of the Balkans: an illyrian, a moesian and an attican one.

PUBLICATIONS RELATED TO THE TOPIC OF THE DISSERTATION:

1. VINÇON, G. & MURÁNYI, D. (2009): Revision of the Rhabdiopteryx neglecta species group (Plecoptera: Taeniopterygidae). — *Aquatic Insects* 30(Suppl.): in press.
2. KOVÁCS, T. & MURÁNYI, D. (2008): New data on genus Besdolus from the Balkan Peninsula (Plecoptera: Perlodidae). — *Illiesia* 4(9): 91–93.
3. VINÇON, G. & MURÁNYI, D. (2007): Leuctra dalmoni, a new orophilic species with wide distribution in Europe (Plecoptera). — *Nouvelle Revue d'Entomologie* 23(3): 237–248.
4. MURÁNYI, D. (2007): New and little-known stoneflies (Plecoptera) from Albania and the neighbouring countries. — *Zootaxa* 1533: 1–40.
5. MURÁNYI, D. (2006): Comparison of Leuctra kisi Steinmann, 1968 with Leuctra quadrimaculata Kis, 1963 (Plecoptera: Leuctridae), and the first record of L. quadrimaculata from Ukraine. — *Opuscula Zoologica Budapest* 35: 73–75.
6. MURÁNYI, D. (2006): Review and contribution to the Plecoptera fauna of Maramureş, Romania. — *Studia Universitatis Vasile Goldiş Arad* 17: 85–94.
7. MURÁNYI, D. (2004): Capnopsis schilleri (Rostock, 1892) in Croatia (Plecoptera: Capniidae). — *Folia entomologica hungarica* 65: 37–42.
8. MURÁNYI, D. (2004): A Perla pallida Guérin, 1838 (Plecoptera) előfordulása és táplálékkínálata a Zempléni-hegység eltérő adottságú kisvízfolyásaiban. [Food supply of Perla pallida Guérin, 1838 (Plecoptera) in small waterflows with different conditions of Mts Zemplén, NE Hungary.] — *Hidrológiai Közlöny* 84: 88–91.
9. MURÁNYI, D. & KONTSCHÁN, J. (2003): Hazai forrástavak akvatikus közösségei. [Aquatic communities of Hungarian spring lakes.] — *Hidrológiai Közlöny* 83(1–12): 97.
10. MURÁNYI, D. (2002): A Nemoura fusca Kis, 1963 álkérész (Plecoptera) faj hazai előfordulása. [The occurrence of Nemoura fusca Kis, 1963 (Plecoptera) in Hungary.] — *Folia entomologica hungarica* 63: 195–196.
11. MURÁNYI, D. & KONTSCHÁN, J. (2002): A hazai Plecoptera (Insecta) és Peracarida (Crustacea) közös előfordulásokról. [On the common occurrences of Plecoptera (Insecta) and Peracarida (Crustacea).] — *Hidrológiai Közlöny* 82(1–12): 86–87.
12. ANDRIKOVICS, S. & MURÁNYI, D. (2001): A checklist of stoneflies with remarks of published, undocumented species and two species new to the Hungarian fauna (Insecta: Plecoptera). — *Folia entomologia hungarica* 62: 23–35.
13. KISS, O., ANDRIKOVICS, S., MURÁNYI, D. & LIPPÓCZY, Á. (2001): A Mátra hegységi Csörgő-patak vízirovar (Trichoptera, Plecoptera, Ephemeroptera) faunája. [The water insect fauna of the Csörgő stream, Mts Mátra, NE Hungary (Trichoptera, Plecoptera, Ephemeroptera).] — *Hidrológiai Közlöny* 81(5–6): 392–393.
14. MURÁNYI, D. (2001): Az Amphinemura standfussi (Ris, 1902) álkérész (Plecoptera) faj a Bakonyvidéken. [Occurrence of Amphinemura standfussi (Ris, 1902) in the Bakony Area.] — *Folia Musei historico-naturalis Bakonyiensis* 18: 19–24.

Book, book chapter:

ANDRIKOVICS, S. & MURÁNYI, D. (2002): Az álkérészek (Plecoptera) kishatározója. — Vízi természet- és környezetvédelem 18., Környezetgazdálkodási Intézet, Budapest, pp. 236.

Conference abstracts:

1. MURÁNYI, D. (2008): The stonefly (Plecoptera) fauna of Montenegro. — In: PEŠIĆ, V. (ed.): The book of Abstracts and Programme, III. International Symposium of Ecologists of Montenegro, Herceg Novi, 08.–10.10.2008, p. 98.
2. VINÇON, G. & MURÁNYI, D. (2008): Revision of the Rhabdiopteryx neglecta species group (Plecoptera: Taeniopterygidae). — Plecoptera Ephemeroptera International Joint Meeting 2008 Programme and Abstract Book, Staatliches Museum für Naturkunde, Stuttgart, p. 106.
3. MURÁNYI, D. (2007): The stonefly (Plecoptera) fauna of the Carpathian Basin and its zoogeographical affinities. — Fauna Pannonica 2007, Kecskemét, p. 46.
4. MURÁNYI, D. (2005): Védendő álkérészek (Plecoptera) és álkérész élőhelyek Magyarország hegyvidékein. [Stoneflies (Plecoptera) and stonefly habitats in need of nature protection in Hungarian mountains] — In: LENGYEL, SZ., SÓLYMOS, P. & KLEIN, Á. (eds): A III. Magyar Természetvédelmi Biológiai Konferencia Program és Absztrakt kötete [Program and Abstract book of the IIIrd Hungarian Conference on Conservational Biology], MBT, Budapest, p. 173.
5. MURÁNYI, D. (2003): A Perla pallida Guérin, 1838 (Plecoptera) táplálékkínálata a Zempléni-hegység eltérő vízfolyásaiban. [Food supply of Perla pallida Guérin, 1838 (Plecoptera) in different waterflows of Mts Zemplén, NE Hungary.] — In: BÍRÓ, P. (ed.): XLV. Hidrobiológus Napok „Vizeink hosszú idejű változásai", Tihany, 2003. október 1–3. Program és előadáskivonatok [XLVth Hydrobiological Days. „Long term changes of aquatic systems", Programme and Abstracts], Tihany, pp. 32–33.
6. MURÁNYI, D. (2003): Kárpáti elterjedésű álkérészek (Plecoptera) környezeti igényei az Északi-középhegységben. [Habitat demands of Carpathian stoneflies (Plecoptera) in the Northern Mountains of Hungary.] — In: DOMBOS, M. & LAKNER, G. (eds): 6. Magyar Ökológus Kongresszus, Gödöllő, 2003. augusztus 27–29. Előadások és Poszterek összefoglalói [6th Hungarian Ecological Congress, Gödöllő, 27–29 August 2003, Abstracts of lectures and posters], Gödöllő, p.195.
7. MURÁNYI, D. & KONTSCHÁN, J. (2001): A Plecoptera (Insecta) és Peracarida (Crustacea) fajok magyarországi együttes előfordulásairól. [On the common occurrences of Plecoptera (Insecta) and Peracarida (Crustacea).] — In: BÍRÓ, P. (ed.): XLIII. Hidrobiológus Napok, Tihany, 2001. október 3–5. Program és előadáskivonatok [XLIIIth Hydrobiological Days, Programme and Abstracts], Tihany, pp. 44–45.
8. MURÁNYI, D. (2001): Adatok a Zempléni-hegység álkérész (Plecoptera) faunájához. [Data to stonefly fauna of Mts Zemplén, NE Hungary.] — In: II. Kárpát-medencei Biológiai Szimpózium, előadások összefoglalói [IInd Biological Symposium of the Carpathian Basin, summaries of the presentations], MBT-MTM, Budapest, pp. 211–214.
9. KISS, O., ANDRIKOVICS, S., MURÁNYI, D. & LIPPÓCZY, Á. (2000): A Mátra hegységi Csörgő-patak vízirovar (Trichoptera, Plecoptera, Ephemeroptera) faunája. [The water insect fauna of the Csörgő stream, Mts Mátra, NE Hungary (Trichoptera, Plecoptera, Ephemeroptera).] — In: BÍRÓ, P. (ed.): XLII. Hidrobiológus Napok „A hidrobiológia aktuális kérdései az ezredfordulón", Tihany, 2000. október 2–4. Program és előadáskivonatok [XLIIth Hydrobiological Days. „The actual problems of hydrobiology in the new millenium", Programme and Abstracts], Tihany, pp. 34–35.
10. MURÁNYI, D. & ANDRIKOVICS, S. (2000): A Nemoura cinerea (Retzius, 1783) álkérészfaj (Plecoptera) növekedése és néhány ökológiai jellemzője hazai vizekben. [Growth and

some ecological parameters of the stonefly (Plecoptera) Nemoura cinerea (Retzius, 1783) in Hungarian waters]. — *Acta Biologica Debrecina Oecologica Hungarica* **11**(1): 282.

11. MURÁNYI, D. (2000): Az 1999-es árvizek hatása a délkelet-mátrai patakok vízi gerinctelen faunájára. [Effects of floods in 1999 to the water macroinvertebrate fauna of the streams in the southeastern parts of Mts Mátra, NE Hungary.] — In: TÓTH, B. (ed): IV. Nemzetközi Környezetvédelmi Szakmai Diákkonferencia, előadások és poszterek összefoglalói [IVth International Conference on Enviromental Protection for Students, abstracts of presntations], GAE, Mezőtúr, p.80.

Popular articles:

1. MURÁNYI, D. (2007): A Kárpát-medence álkérészei. — In: FORRÓ, L. (ed.): *A Kárpát-medence állatvilágának kialakulása*. Magyar Természettudományi Múzeum, Budapest, pp. 57–64.

2. MURÁNYI, D. (2003): The running water inhabitant fauna of the Bükk National Park. — *Carpathi* 11: 8–9.

3. MURÁNYI, D. (2003): A Bükk folyóvizeinek gerinctelen faunája. [Invertebrata fauna in the running waters of Mts Bükk.] — In: BARÁZ, CS. (ed): Rejtektől Tárkányig, Bükki Nemzeti Park Igazgatósága, Eger, pp. 121–127.

4. MURÁNYI, D. & KONTSCHÁN, J. (2002): Kis tavak a Bakonyban II. – a bakonybéli Borostyán-kút [Small lakes of the Mts Bakony II. – Borostyán spring at Bakonybél.] — In: ESTÓK, B. (ed): Kis-tó Projekt 2002, Életfa Környezetvédő szövetség, Eger, pp. 59–72.

Oral presentations:

1. MURÁNYI, D. (2006): Albánia álkérész-faunája. — A Magyar Rovartani Társaság 751. előadóülése, 2006.11.18., Budapest

2. MURÁNYI, D. (2005): A Balkán álkérész faunájának kutatástörténeti és állatföldrajzi áttekintése. — A Magyar Biológiai Társaság Állattani Szakosztályának 938. előadóülése, 2005.02.02. Budapest

3. MURÁNYI, D. (2003): Albánia vízirovar faunája az újabb gyűjtések tükrében. — A Magyar Biológiai Társaság Állattani Szakosztályának 930. előadóülése, 2003.11.06. Budapest

OTHER PUBLICATIONS:

1. MURÁNYI, D. (2008): The first species of the genus Megabunus Meade, 1855 (Opiliones: Phalangiidae) in the Balkan region. — *Opuscula Zoologica Budapest* 39: in press.

2. MURÁNYI, D. (2007): Contribution to the Odonata fauna of Albania. — *Folia entomologica hungarica* 68: 41–53.

3. MURÁNYI, D. (2007): Peruphasma marmoratum, a remarkable new species of high montane Phasmatodea (Pseudophasmatidae: Pseudophasmatinae) from the Venezuelan Andes. — *Zootaxa* 1398: 57–67.

4. MURÁNYI, D. & LENGYEL, G. D. (2006): Contribution to the Opiliones fauna of Maramureş, Romania. — *Studia Universitatis Vasile Goldiş Arad* 17: 77–83.

5. MURÁNYI, D. & KONTSCHÁN, J. (2006): Collecting sites of the Hungarian Natural History Museum in Maramureş, Romania, between 2004 and 2006. — *Studia Universitatis Vasile Goldiş Arad* 17: 31–36.

6. KORSÓS, Z.; DÁNYI, L.; KONTSCHÁN, J. & MURÁNYI, D. (2006): Az öves szkolopendra (Scolopendra cingulata Latr., 1829) magyarországi állományainak helyzete. [On the Hungarian populations of Scolopendra cingulata]. — *Természetvédelmi Közlemények* 12: 155–163.

7. LENGYEL, G. D. & MURÁNYI, D. (2006): Data to the Hungarian harvestman (Opiliones) fauna. — *Folia historico-naturalia Musei Matraensis* 30: 117–128.

8. MURÁNYI, D. (2005): Amilenus aurantiacus (Simon, 1881) (Opiliones) new to Hungary. — *Folia entomologica hungarica* 66: 7–8.

9. MURÁNYI, D. (2005): Leuctra klapperichi, a new stonefly species (Plecoptera: Leuctridae) from Iran with geographic affinities of related species. — *Zootaxa* 1078: 59–64.

10. LENGYEL, G. D., MURÁNYI, D. & KONTSCHÁN, J. (2004): Adatok a Holoscotolemon jaqueti Corti, 1905 (Opiliones) ismeretéhez [Data to the knowledge of the Holoscotolemon jaqueti Corti, 1905 (Opiliones)]. — *Folia entomologica hungarica* 65: 232–234.

11. FEHÉR, Z., ERŐSS, Z., KONTSCHÁN, J. & MURÁNYI, D. (2004): Collecting sites of the zoological expeditions of the Hungarian Natural History Museum to Albania (1992-2003). — *Folia historico-naturalia Musei Matraensis* 28: 67–82.

12. ANDRIKOVICS, S. & MURÁNYI, D. (2003): Zoobentosz együttesekről a Szabadszállás-Fülöpszállás környéki fehér szikes vizekben. [Zoobenthic assemblages in white sodic waters near Szabadszállás-Fülöpszállás (Hungary).] — *Természetvédelmi Közlemények* 10: 251–271.

13. KONTSCHÁN, J., MURÁNYI, D. & TRASER, GY. (2003): Data to the distribution of the Tetrodontophora bielanensis (Waga, 1842) (Collembola: Onychiuridae). — *Annales historico-naturales Musei nationalis hungarici* 95: 107–111.

14. KONTSCHÁN, J., B. MUSKÓ, I. & MURÁNYI, D. (2002): A felszíni vizekben előforduló felemáslábú rákok (Crustacea: Amphipoda) rövid határozója és előfordulásuk Magyarországon. [Short identification key and occurrence of the freshwater amphipods in Hungary.] — *Folia historico-naturalia Musei Matraensis* 26: 151–157.

15. MURÁNYI, D. (2002): Platybunus pallidus Šilhavý, 1938, faunánkra új kárpáti elterjedésű kaszáspók (Opiliones) a Zempléni-hegységből. [Platybunus pallidus Šilhavý, 1938, a Carpathian harvestman (Opiliones) from the Zemplén Mts, new to the fauna of Hungary.] — *Folia entomologica hungarica* 63: 181–182.

16. KORSÓS, Z., KONTSCHÁN, J. & MURÁNYI, D. (2001): Újabb adatok a Polydesmus collaris C. L. Koch, 1847 (Diplopoda: Polydesmida) bakonyi elterjedéséhez. [Further data to the distribution of Polydesmus collaris C. L. Koch, 1847 (Diplopoda: Polydesmida) in the Bakony Area.] — *Folia Musei historico-naturalis Bakonyiensis* 18: 15–18.

17. SMITH, M. E., ANDRIKOVICS, S. & MURÁNYI, D. (1997): New record of Haplotaxis gordioides (Oligochaeta: Haplotaxidae) from Hungary and its occurrence in tap water. — *Folia historico-naturalia Musei Matraensis* 22: 81–83.

Book, book chapter:

MURÁNYI, D. & KONTSCHÁN, J. (2002): Pseudoscorpions from the Fertő-Hanság National Park. — In: MAHUNKA, S. (ed): The fauna of the Fertő-Hanság National Park, MTM, Budapest, pp. 191–194.

Conference abstracts:

1. KORSÓS, Z., DÁNYI, L., KONTSCHÁN, J. & MURÁNYI, D. (2002): Az öves szkolopendra magyarországi állományainak helyzete. [The status of the Hungarian populations of Scolopendra cingulata.] — In: LENGYEL, SZ., SZENTIRMAI, I., BÁLDI, A., HORVÁTH, M. & LENDVAI, Á. Z. (eds): Az I. Magyar Természetvédelmi Biológiai Konferencia Program és Absztrakt kötete [Program and Abstract book of the Ist Hungarian Conference on Conservational Biology], MBT, Budapest, p. 144.
2. KONTSCÁN, J., DÁNYI, L. & MURÁNYI, D. (2002): A Vértes hegység védett területeinek talajfaunája a természetvédelem tükrében. [The soil fauna of the protected areas of Mts Vértes (Hungary) in the point of view of nature protection.] — In: LENGYEL, SZ., SZENTIRMAI, I., BÁLDI, A., HORVÁTH, M. & LENDVAI, Á. Z. (eds): Az I. Magyar Természetvédelmi Biológiai Konferencia Program és Absztrakt kötete [Program and Abstract book of the Ist Hungarian Conference on Conservational Biology], MBT, Budapest, p. 141.

Oral presentations:

MURÁNYI, D. (2006): Az Andok magashegyi botsáskái; az Anisomorphini tribus első venezuelai fajai. — A Magyar Biológiai Társaság Állattani Szakosztályának 952. előadóülése, 2006.10.04. Budapest